

Five-Year Review Signature Cover

Key Review Information

Site Identification			
Site Name: Alabama Army Ammunition Plant		EPA ID: AL6210020008	
Region: 4	State: AL	City/County: Childersburg, Talladega	
Site Status			
NPL Status: July 1987			
Remediation status: Complete at OUs reviewed			
Multiple OUs* <u>Y</u> N Number of OUs: 6			
Construction Completion Date:			
Fund/PRP/Federal Facility lead: Federal Facility		Lead Agency: Federal Facility	
Has site been put into reuse? <u>Y</u> N Partially (only Area A)			
Review Status			
Who conducted the review? United States Environmental Protection Agency			
Author name: Dann Spariosu		Author title: Remedial Project Manager	
Author affiliation: USEPA			
Review Period: November, 2002			
Highlight: Statutory Policy	Policy type:	Review number: 1	
Triggering action event: Five years since start of remedial action.			
Trigger action date: 01/04/1995		Due date: 01/04/2000	

* "OU" refers to Operable Unit

Deficiencies:

Noted deficiencies were at the NHWL and at the Area 22 Demolition Debris landfills where it could not be ascertained if the grass cover was viable and capable of regenerating. The sites are covered with dead rye grass.

The asbestos repository and the Area 22 Landfill require fencing to meet the provisions of ADEM post closure requirements.

Recommendations and Required Actions:

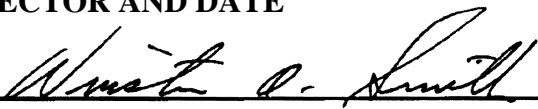
All three landfill areas should be mowed. A funds request by Army Corps of Engineers has been sent forward to Operating Services Command (OSC) and Army Materiel Command (AMC) for funding to complete the fencing.

Protectiveness Statements:

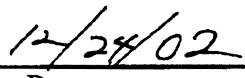
The remedy at OU-2 is protective of human health and the environment, exposure pathways that could result in unacceptable risks are being controlled, and institutional controls are in place and operating effectively.

Other Comments:

**SIGNATURE OF EPA REGIONAL ADMINISTRATOR OR DIVISION
DIRECTOR AND DATE**



Signature



Date

Winston A. Smith, Director, Waste Management Division, USEPA, Region 4

Name and Title

ACRONYMS AND ABBREVIATIONS

1,3,5-TNB	1,3,5-Trinitrobenzene
2,4-DNT	2,4-Dinitrotoluene
2,6-DNT	2,6-Dinitrotoluene
4-A-2,6-DNT	4-Amino-2,6-Dinitrotoluene
ACM	Asbestos-Containing Material
ADEM	Alabama Department of Environmental Management
AGS	Alabama Geological Survey
AIRS	Aerometric Information Retrieval System
ALAAP	Alabama Army Ammunition Plant
AST	Aboveground Storage Tank
BCP	BRAC Cleanup Plan
BLS	Below Land Surface
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CEB	Chemical Exceeding Background
CERFA	Community Environmental Response Facilitation Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CICS	Chemicals in Commerce Information System
COC	Chemical of Concern
CRL	Certified Reporting Limit
DA	U.S. Department of the Army
DBH	Diameter at Breast Height
DLMSHA	Department of Labor, Mine Safety and Health Administration
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPA	Diphenylamine
DQO	Data Quality Objective
EBS	Environmental Baseline Survey
ECC	Environmental Chemical Corporation
ecoCOC	Ecological Chemical of Concern
ecoRGO	Ecological Remediation Goal Option
EDR	Environmental Data Resources, Inc.
EP	Extraction Procedure
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ESE	Environmental Science and Engineering, Inc.
FATES	FIFRA and TSCA Enforcement System
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act

FINDS	Facility Index System
FMGS	Former Manufactured Gas Sites
FOST	Finding of Suitability to Transfer
FRDS	Federal Reporting Data System
FS	Feasibility Study
FURS	Federal Underground Injection Control
GOCO	Government-owned/Contractor-operated
GSA	General Services Administration
HI	Hazard Index
HMX	Cyclotetramethylenetetranitramine
HQ	Hazard Quotient
HRS	Hazard Ranking System
ID	Identification
IROD	Interim Record of Decision
IRP	Installation Restoration Program
ISS	Industrial Sewer System
LUST	Leaking Underground Storage Tank
mgd	Million Gallons per Day
msl	Mean Sea Level
NAWQC	National Ambient Water Quality Criteria
NC	Nitrocellulose
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NTIS	National Technical Information Service
PADS	PCB Activity Database System
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCS	Permit Compliance System
ppb	Parts per Billion
ppm	Parts per Million
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RGO	Remediation Goal Option
ROD	Record of Decision
SAIC	Science Applications International Corporation
SCS	Soil Conservation Service
SHWS	State Hazardous Waste Sites
SIA	Surface Impoundments
SQG	Small Quantity Generator
SVOC	Semivolatile Organic Compound

SWF/LF	Solid Waste Facilities/Landfill Sites
T&E	Threatened and Endangered
TCLP	Toxicity Characteristics Leaching Procedure
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNT	2,4,6-Trinitrotoluene
TPH	Total Petroleum Hydrocarbons
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VCP	Vitrified Clay Pipe
VOC	Volatile Organic Compound
Weston	Roy F. Weston

OPERABLE UNITS

EPA Designation	Army Designation	Description
OU-1	Area B, OU-2	Stockpile soils
OU-2	Area B, OU-3	Study Areas 6, 7, 10, 21
OU-3	Area A, OU-2	Study Areas 12 and D
OU-4	Area B, OU-1	Area B Soil and Groundwater
OU-5	Area A, OU-1	Area A Soil and Groundwater
OU-6	Area B, OU-4	Area B, Study Areas 2, 10, 16, 17, 19, 22

Note: To avoid confusion, EPA Operable Unit designations are used throughout this review

I. INTRODUCTION

This initial 5-year review is to evaluate the performance of the remedial actions taken at Alabama Army Ammunition Plant (ALAAP), Operable Unit Two (OU-2) and Operable Unit Six (OU-6). OU-2 is comprised of Study Area 6 - Southern TNT Manufacturing Area, Study Area 7 - Northern TNT Manufacturing Area, Study Area 10 - Teteryl Manufacturing Area, and Study Area 21 - Red Water Ditch which drained wastes and by-products from manufacturing areas 6, 7, and 10. The remedial action consisted of the excavation, stockpiling and thermal decontamination (incineration) of 73,940 cubic yards of soil contaminated with trinitrotoluene (TNT), dinitrotoluene (DNT), teteryl, lead, and the manufacturing and breakdown products of these explosives. Additionally, 14,000 linear feet of encased and 5,800 linear feet of uncased sewer line were excavated, decontaminated and disposed of in the on-site landfill. The remedial action was performed under an Interim Record of Decision (IROD) dated November 30, 1994 and the Remedial Design was approved on November 17, 1994. The remedial action construction started on December 19, 1994 and the remedial action was completed on July 1, 1998.

OU-6 is comprised of Study Area 2 - Smokeless Powder Manufacturing Area, Study Area 16 - Flashing Grounds, Study Area 17 - Propellants Shipping and Storage Area, Study Area 19 - Lead Remelt Facility, and Study Area 22 - Demolition Debris Landfill. These areas were remediated under an IROD dated October 20, 1996. Remediation of explosives contaminated soils was completed on January 18, 1997. Final documents have not been prepared for this IROD. Approximately 14,444 cubic yards of explosives containing soil was removed from areas 2, 10, 16, 17, and 19 and thermally decontaminated. Additionally, 1,500 cubic yards of lead contaminated soil was removed from the lead remelt area, stabilized in a pug mill and disposed of in the on-site non-hazardous landfill. Study Area 22 was closed with an engineered cap. The OU-6 Final Closure Report is scheduled for July 23, 2002.

The purpose of the 5-year review is to determine whether the site remedy is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

This review is required by statute. The United States Environmental Protection Agency (EPA) must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121(c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such

review it is the judgment of the President that action is appropriate at such site in accordance with CERCLA, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

II. SITE CHRONOLOGY

Table 1 lists the chronology of events for the Alabama Army Ammunition Plant (ALAAP).

TABLE 1: SITE CHRONOLOGY

Date	Title/Author	Summary
May 1978	Installation Assessment of ALAAP (USATHAMA)	Initial study; specific areas of the facility were found to be potentially contaminated by explosives and lead.
July 1981	Environmental Survey of ALAAP (ESE)	Identified the type and extent of contamination due to past operations in order to release ALAAP as excess property.
June 1983	Confirmatory Environmental Survey, ALAAP, Final Report (ESE)	Further defined the extent of contamination in the Industrial Area and part of the GSA Area and characterized the hydrogeology of the site.
July 1986	ALAAP RI Final Report (ESE)	The RI yielded findings of nitroaromatic, lead, and asbestos contamination in various media.
September 1987	Preliminary Natural Resource Survey, ALAAP (USFWS)	The survey indicated the presence of critical habitat and endangered species.
November 1987	ALAAP FS, Final Report (ESE)	An FS was performed to develop remedial responses to uncontrolled releases.
January 1991	Stockpile Characterization Report for ALAAP (ESE)	Explosives, lead, and asbestos were identified at concentrations greater than acceptable regulatory limits.
September 1991	RI/FS of the Industrial Sewer System, ALAAP (ESE)	Recommended excavation, onsite mobile rotary kiln incineration, and onsite landfilling for the nitroaromatic contaminated media in the vicinity of the sewerlines and manholes.
October 1991	FS for the ALAAP Soil Stockpile Area (Roy F. Weston)	Incineration identified as the preferred remediation method.
December 1991	ROD, ALAAP, Alabama Stockpile Soils Area Operable Unit 1	A ROD was filed for Stockpile Soils in Building TC4A in Area B with incineration as the chosen remediation method.

August 1992	Supplemental RI/FS for Area B, ALAAP, Final Baseline Risk Assessment, Vol. I, II (ESE)	Established the risks to public health, welfare, and the environment.
June 1993	Supplemental RI/FS for Area B, ALAAP, Final Remedial Investigation, Vol. I, II (ESE)	This RI updated the 1986 RI and further characterized Area B by summarizing the data collected during this investigation with data obtained during previous surveys.
April 1994	IROD Stockpile Soils (Roy F. Weston)	Identified stabilization and incineration as the preferred remedial alternatives.
April 1994	CERFA Report (TETC)	Investigation initiated by BRAC and CERFA to identify real property that could immediately be reused and/or redeveloped; identified new study areas.
November 1994	IROD, ALAAP, Study Areas 6, 7, 10, and 21 of the Area B Soil Operable Unit 2 (Roy F. Weston)	The interim remedial action consisted of excavating, transporting, onsite thermal treatment/solidification, and landfilling of 400,000 cubic yards of contaminated soils.
October 1996	IROD, ALAAP, Study Areas 2, 10, 16, 17, 19, and 22	The interim remedial action consisted of excavating, transporting, onsite thermal treatment/solidification, and landfilling of 14,444 cubic yards of contaminated soils.

III. BACKGROUND

The ALAAP facility is located in Talladega County, Alabama, approximately 4 miles north of the town of Childersburg and 40 miles southeast of the city of Birmingham. The plant was established in 1941 on 13,233 acres of land near the junction of Talladega Creek and the Coosa River. The original mission of ALAAP was to manufacture trinitrotoluene (TNT), dinitrotoluene (DNT), 2,4,6-trinitrophenyl methyl nitramine (tetryl), and single-base smokeless powder for cannon and small arms in support of World War II efforts. The plant also produced the necessary supporting chemicals for the manufacturing operations, including nitric and sulfuric acids.

The ALAAP facility was operated by the El duPont Company as a Government-owned/contractor-operated (GOCO) facility during World War II with the intent of producing nitro-cellulose (NC), single-base smokeless powder, and nitroaromatic explosives (i.e., TNT, DNT, and tetryl). The plant was designed to manufacture 400,000 pounds of TNT; 30,000 pounds of DNT; and 36,000 pounds of tetryl on a daily basis. The plant's peak monthly production of the nitroaromatic explosives was 15.6 million pounds of NC in October 1942, 21.8 million pounds of TNT in April 1945, and 2.4 million pounds of tetryl in March 1945 (DA 1978). In addition to the manufacture of propellants and explosives, the plant produced sulfuric and nitric acid, aniline, diphenylamine (DPA), oleum (40 percent sulfur trioxide and sulfuric acid), sellite (sodium sulfite), and N,N-dimethylaniline. Spent acids were recycled and unrecoverable wastes resulting from these operations were disposed of onsite by discharge to an unlined ditch (DA 1978). Average daily production of oleum and sellite at ALAAP during its operation was 400 and 15 tons, respectively. In August 1945, the plant reverted to a standby status and the Government began excessing property.

The acid facility was leased to Tennessee Copper Corporation between 1947 and 1966 for the manufacture of acids and organic compounds on the site.

Beaunit Corporation, an affiliate of El Paso Natural Gas, manufactured rayon in a leased area north of Area B (see Figure 1-2). The mill was in operation from 1949 to 1971 and went out of business in 1972. The mill also leased Power Plant 2 and its ancillary facilities from the U.S. Army. From 1949 until 1952 Beaunit mills discharged wastes into unlined settling basins on the property. The Army had constructed the basins prior to selling the property to Beaunit, but never used the basins. Beaunit installed an industrial waste system in 1952.

In January 1954, the Government entered into a contract with the Liberty Powder Defense Corporation, a subsidiary of Olin Mathieson Chemical Corporation, in an effort to rehabilitate the plant. The contract provided for maintenance and consultant services in connection with the plant rehabilitation. Rehabilitation was initiated in April 1955, but was halted in October 1957 with only 75 percent of the rehabilitation complete. The plant was maintained in various stages of standby status until the early 1970s.

In 1973, the U.S. Army released the ALAAP facility to the General Services Administration (GSA) so that it could be sold. However, GSA declined to accept 1,620 acres of the former manufacturing area, part of what is now designated as Area B, because the area could not be certified free from contamination. Beginning in 1973, a controlled burning program was implemented by the U.S. Army to destroy explosives residues in the former industrial and storage areas. Nearly all of the buildings that were components of the explosives manufacturing facilities and the acid and organic chemical manufacturing facilities were burned. Sewers and underground utilities were left intact (ESE 1981).

The areas of ALAAP that were assessed by GSA in 1973 to be uncontaminated comprise the GSA Area. In 1977, a 1,354-acre parcel in the GSA Area containing the former NC manufacturing area, the smokeless powder manufacturing area, and 247 associated buildings was sold to Kimberly-Clark Corporation. In the same year, the U.S. Army leased back 291 acres within the GSA Area from Kimberly-Clark so that the area could be decontaminated, the manufacturing equipment removed, and the buildings razed. These areas comprise the Leaseback Area. One hundred and fifty-five additional buildings used primarily for explosives storage were left intact (ESE 1981). The paper mill was later sold to U.S. Alliance Forest Products and was recently sold to Bowater Newsprint Corporation. The paper mill has a Resource, Conservation and Recovery Act (RCRA) generator permit and has a National Pollutant Discharge Elimination System (NPDES) permit for releases to surface water, and has a Clean Air Act (CAA) permit that requires it to submit air emissions reports.

By 1981, the facility had been divided into Area A (2,714 acres) to the east, containing the former storage area and GSA Area still under U.S. Government control, and Area B (2,187 acres), consisting of the former manufacturing (industrial) area (see Figure 1-2). In 1988, the Secretary of Defense recommended that the ALAAP facility be closed and placed it on the U.S. Department of Defense (DOD) BRAC 88 list. Area A was

auctioned in May 1990 to private buyers who currently use the properties for pasture, logging and as a licensed hunting preserve. Area B remains under U.S. Army control and is bounded by Little Blue Creek to the north, the Coosa River to the west, and Talladega Creek and the Bowater Corporation paper mill to the south. The facility was proposed for inclusion on the NPL by EPA in 1984 and was included on the list in 1987. The Area A portion of the ALAAP facility is currently in the process of being deleted from the NPL.

The U.S Army conducted the first comprehensive environmental assessment at ALAAP in 1978 (DA 1978). The investigation, consisting of a records evaluation and a site inspection, summarized facility operations and manufacturing processes, and identified sites (including buildings) throughout the facility that exhibited visible contamination or presented the potential for contamination of the environment. The records search concluded that facility areas are potentially contaminated with chemical and explosives manufacturing wastes, including TNT, DNT, tetryl, smokeless powders, acids/organic compounds, and metals, and that the potential exists for contaminated surface runoff.

Environmental Science and Engineering (ESE) conducted an Environmental Survey (later referred to as the Exploratory Survey) (ESE 1981) and a Confirmatory Environmental Survey (ESE 1983) of the ALAAP facility under contract to the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) between 1979 and 1983. Contamination by explosives residues in soil, sediment, and shallow groundwater in the manufacturing areas on ALAAP was noted in the Exploratory Survey report (ESE 1981).

The Confirmatory Environmental Survey (ESE 1983) was conducted to verify the presence of environmental contamination, investigate the magnitude and extent of the releases at the facility, and assess potential environmental and human health impacts. The Confirmatory Environmental Survey (ESE 1983) evaluated eight sites in Area B, including the Red Water Storage Basin, the Northern and Southern TNT Manufacturing Areas, the Aniline Sludge Basin (Study Area 9), the Tetryl Manufacturing Area, the Flashing Ground (Study Area 16), the Red Water Ditch, and the Beaver Pond Drainage System (Study Area 27). Nitroaromatic residues were detected in soil and sediment in the TNT manufacturing areas and the Red Water Ditch and were cited as a potential source of groundwater contamination. Groundwater contamination by nitroaromatic compounds was detected in the shallow groundwater beneath the TNT manufacturing areas (ESE 1983).

The initial RI was conducted on ALAAP by ESE using data obtained on the facility between 1980 and 1986 (ESE 1986) to identify and fill data gaps identified from the previous environmental surveys. The study evaluated 15 study areas, including the 8 areas evaluated during the environmental surveys (ESE 1981, 1983) and the Sanitary Landfill and Lead Facility (Study Area 3), the Old Burning Ground, the Old Well, the Lead Facility (Study Area 19), the Demolition Landfill (Study Area 22), the Storage Battery/Demolition Debris Area (Study Area 25), the Crossover Ditch (Study Area 26), and the Flaker Screen Wash Area. The RI concluded that sediments in the major facility drainages (Beaver Pond, Crossover Ditch, and Red Water Ditch) were contaminated with

nitroaromatic compounds and surface water concentrations of nitroaromatic compounds were detected in the Beaver Pond Drainage System and the Red Water Ditch. Consistent with the previous environmental surveys, groundwater contamination by nitroaromatic compounds in the TNT manufacturing areas was detected during the initial RI. Soil in the TNT manufacturing areas and the Old Burning Ground contained nitroaromatic residues that were associated with the former manufacturing and subsequent demolition activities on ALAAP. Extractable lead concentrations were detected at the Lead Facility site. Asbestos and friable asbestos were detected during the study over all areas where buildings were razed and scattered during demolition (ESE 1986).

A Supplemental RI was conducted by ESE between 1989 and 1990 to fill identified data gaps associated with the previous site studies. The scope of the Supplemental RI was to further quantify the extent of groundwater contamination, assess ecological and human health exposures, and revise the project FS. The Supplemental RI evaluated seven study areas, including the TNT manufacturing areas, the Flashing Ground, the Red Water Ditch, the Crossover Ditch, the Beaver Pond Drainage System, and the Area A and B Divide. The supplemental study concluded that although groundwater contamination by nitroaromatic compounds was detected in shallow and deep groundwater, significant migration from the sites was not occurring. Nitroaromatic compounds and dissolved lead were not detected during the analysis of groundwater from public supply wells during the Supplemental RI. Nitroaromatic compounds were not detected in surface water or sediment samples from the site drainages (ESE 1993).

A Characterization Study (ESE 1991c) was conducted in 1991 to assess stockpiled soil that was excavated from Area A and stored in Area B. In October 1991, an FS (Weston 1991) was completed for these soils and an Interim ROD was issued in December 1991 (Dresen 1991). The IROD recommended stabilization and incineration as the preferred alternative. A Remedial Design (RD) for the Stockpile Soils was approved in April 1994 (Weston 1994a). The soils were excavated, incinerated, and transported to Backfill Area No. 1 in December 1994. Stabilization proved unnecessary as all of the contamination was destroyed by incineration and no waste was left onsite in the landfill.

A CERFA investigation was conducted at ALAAP in April 1994 under the BRAC environmental restoration program, as required by Public Laws 100-526 and 101-510 (TETC 1994). The associated report identified real property in Area B that could be immediately reused and redeveloped. The study also identified six additional areas with environmental concerns that were not considered during previous investigations. These areas include Building 6 – Coke Oven, a transformer storage building, downed utility poles with transformers, a former gas station, UST sites, and a fertilizer and pesticide storage building.

In November 1994, an IROD was approved to remediate soils, sediments, and vitrified clay pipes (VCPs) in Study Areas 6, 7, 10, and 21 (OU-2). Incineration was selected as the primary treatment technology with stabilization as the secondary treatment technology, if required (Weston 1994a).

IV. REMEDIAL ACTIONS

A. REMEDY SELECTION

The selected remedy for OU-2 and OU-6 was incineration and on-site disposal of the contaminated soils. The remedy for OU-2 was selected in an Interim Record of Decision (IROD) dated November 30, 1994 and the Remedial Design was approved on November 17, 1994. The remedial action started on December 19, 1994 and was completed on July 1, 1998. The remedy for OU-6 was selected in an IROD dated 20 October 1996. Remediation of explosives contaminated soils was completed on 18 January 1997. Final documents have not been prepared for this IROD. Additionally, any ash or soil that failed TCLP for lead was stabilized in a pug mill and placed in the on-site disposal landfills. The selected remedy for OU-2 and OU-6 did not apply to groundwater. Groundwater investigations are not complete at ALAAP, therefore a groundwater remedy has not been selected. The selected soils remedy was comprised of the following actions:

- Clear, survey and grid areas; perform soil and sediment sampling and chemical analysis to delineate explosives and metals contamination
- For contaminated area, excavate soils until excavation criteria are satisfied; transport materials to the TIS-20 site in Area B; treat materials by incineration and/or stabilization until treatment and disposal criteria are satisfied; dispose of treated material in the on-site backfill area.
- If necessary, expand the on-site disposal area for final placement of treated materials.
- Decontaminate oversize materials by crushing or shredding and treatment in the TIS-20, or by high-pressure washing; dispose of decontaminated materials in the on-site backfill area.
- Treat contaminated process, sampling and decontamination waste waters in the TIS-20 aqueous waste treatment system; reuse water for site dust control and process makeup.
- Conduct confirmatory soil and sediment sampling and conduct chemical analysis to ensure that excavation criteria have been satisfied.
- Backfill excavated areas with uncontaminated borrow soils and rough grade to pre-excavation contours.

The selected remedy for the Area 22 landfill in OU-6 was an engineered cap. The existing surface of the landfill was cleared and graded prior to the installation of a 30-mil polyvinyl chloride (PVC) membrane liner. The liner was covered with a protective soil layer that was sloped to drain. The boundaries of the completed landfill cover were surveyed and the boundaries marked. Complete details of the Area 22 landfill closure are contained in the Final Report, Area 22 Landfill Cap, Alabama Army Ammunition Plant, Childersburg, Alabama, Environmental Chemical Corp., February, 1999.

B. REMEDY IMPLEMENTATION

The OU-2 remedy was implemented in accordance with the IROD dated November 30, 1994. The Remedial Design was approved on November 17, 1994. The remedial action started on December 19, 1994 and was completed on July 1, 1998. The remedy for OU-6 was selected in an IROD dated 20 October 1996. Remediation of explosives contaminated soils was completed on 18 January 1997. The draft Project Closeout Reports for both OU-2 and OU-6 were submitted by Roy F. Weston in July 1998.

As specified in the IRODs, contaminated soils were excavated, stockpiled, incinerated and disposed of in the on-site disposal cells. Soils, sediments and fly ash that failed TCLP analysis were stockpiled for later stabilization and landfilling.

TABLE 2
FINAL QUANTITIES OF MATERIAL ADDRESSED IN AREA B

Category	Origin of Material	Quantity (yd ³)	Total Quantity per Category (yd ³)
Excavated Material	Study Areas 6,7,10 and 21	74,138	116,698
	Study Areas 2, 16, 17 and 19	15,105	
	ISS Overburden	16,550	
	ISS VCP pipeline	10,905	
Thermally treated through TIS-20	Study Areas 6,7,10 and 21	68,627 (96,078 tons)	95,678 (133,950 tons)
	Study Areas 2, 16, 17 and 19	14,444 (20,222 tons)	
	ISS	12,607 (17,650 tons)	
Industrial Sewer System in Study Areas 6, 7, 10 and 21	Encased pipe grouted and closed-in-place	13,873 ft.	19,719 ft.
	Un-encased pipe removed	5,846 ft.	
Oversize debris decontaminated	Study Areas 2, 16, 17, 19 and ISS	2,152	2,152
Material awaiting stabilization for disposal in Cell #8	Treated bottom ash and fly ash from TIS-20 which failed TCLP for metals but passed for explosives.	7,731 (9,278 tons)	10,473 (13,116 tons)
	Excavated soil which failed for TCLP metals but passed for explosives.	2,741 (3,838 tons)	

Material awaiting backfilling*	Treated bottom ash and fly ash from TIS-20 which passed all treatment criteria and awaiting disposal in Cell # 8	18,218 (21,862 tons)	18,218 (21,862 tons)
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From: Roy F. Weston Project Closeout Report, Alabama Army Ammunition Plant (ALAAP), Childersburg, Alabama, July 1998, DRAFT.

* All treated bottom ash and fly ash was subsequently placed in Cell #8. Refer to: FINAL REPORT, STABILIZATION OF INCINERATOR TREATED SOIL AND FLYASH AND EXCAVATED SOIL FROM STUDY AREAS 14, 16, & 19, FINAL CAP CELL #8, ALABAMA ARMY AMMUNITION PLANT, CHILDERSBURG, AL, Environmental Chemical Corporation (ECC), January 1999.

TABLE 3

**EXCAVATION CLEANUP GOALS
ALABAMA ARMY AMMUNITION PLANT, CHILDERSBURG, ALABAMA**

Compound/ Analyte Class	Compound/Analyte	Criteria
Explosives	1,3-DNB	> 1 ppm
	2,4-DNT	>356 ppm
	2,6-DNT	>356 ppm
	Tetryl	>5,000 ppm
	1,3,5-TNB	>36.7 ppm
	TNT	>348
Metals (total)	Lead	>400 ppm

Source: Roy F. Weston 1996c

TABLE 4

DISPOSAL CRITERIA FOR INCINERATED MATERIAL

COC	Concentration	Units
Explosives		
TNT	<1	ppm
Metals		
Arsenic	<5	mg/L
Barium	<100	mg/L
Cadmium	<1	mg/L
Chromium	<5	mg/L
Lead	<5	mg/L
Mercury	<0.2	mg/L*
Silver	<5	mg/L
Selenium	<1	mg/L

* 4 µg/g using total metals analytical method

C. SYSTEM OPERATIONS

The excavation, incineration, and on-site ash disposal completed the selected remedy for OU-1, OU-2 and OU-6. No ash or soil stabilization was required for any of the OU-1 (stockpile) soils, while some ash and soil from OUs 2 and 6 required stabilization prior to landfilling. There is no on-going remedy process for the ALAAP Area B soils.

This inspection focused on the on-site landfills associated with incineration of the contaminated soil (the non-hazardous landfill), the Area 22 Demolition Debris Landfill closed as a task in the OU-6 IROD, and the Asbestos Repository.

The non-hazardous waste landfill (NHWL) comprises an area of four acres located in Study Area 8. It was used to dispose of ash generated by the thermal decontamination of the soils contaminated by explosives excavated from various locations on ALAAP. The ash residue was sampled and all samples with excessive lead levels were stabilized to allow for disposal in the landfill. The landfill includes eight cells constructed with a high density polyethylene (HDPE) top and bottom liner and soil cover. The NHWL is surrounded with a 6-foot high chain link fence topped with 3 strands of barbed wire. The fence is equipped with two lockable 20-foot wide gates.

The basement of Building 2140 was used as a repository for friable asbestos during building demolitions performed in the 1970's. The basement was covered with a concrete cap at the end of demolition operations. The concrete cap cracked and was repaired with a compacted clay cap in October 1999. The repository still contains asbestos.

At the present, there is not a formalized surveillance process in place for these landfills. The landfills are observed and inspected by an employee of the Mobile District, U.S. Army Corps of Engineers whenever he is on-site monitoring A/E operations or other tasks. These informal inspections have been sufficient to detect required maintenance or needed improvements.

TABLE 5

O&M EXPENDITURES

Date	Task	Costs
October, 1999	Repair of Asbestos Repository Cap	\$582,000
October, 2001	Repair Area B Perimeter Fence	\$22,500
2001	Re-grade and re-grass NHWL, Area 22 Landfill, and Asbestos Repository and Fence NHWL	\$87,000

V. FIVE-YEAR REVIEW PROCESS

The ALAAP five-year review was lead by Dann Spariosu, EPA Remedial Project Manager (RPM) for ALAAP. The five year review consisted of the following activities: a site inspection, document review, and review of changes in standards and “to be considered”, and review of changes in exposure pathways and toxicity.

TABLE 4:
SITE INSPECTION ATTENDEES

NAME	AGENCY	POSITION	TELEPHONE	E-MAIL
Dann Spariosu	USEPA	RPM	(404)562-7786	spariosu.dann@epa.gov
C.H. Cox	ADEM			Chc@adem.state.al
E. Ross McCollum	COE	Geologist	(251)690-3113	ernest.r.mccollum@sam.usace.army.mil

VI. FIVE YEAR REVIEW FINDINGS

A. SITE INSPECTION

The meeting convened on-site at 10:00 hours.

The Asbestos Repository was the first site visited in the site inspection. The cover appeared to be in good condition with only minor erosion rills evident. The vegetation on the cover is in good condition and appears healthy. The landfill cover requires mowing.

A drive by inspection was conducted for Study Areas 6, 7 and 10. Vegetation has totally reclaimed these areas and a walk over was not practical.

The Non Hazardous Landfill was inspected next. The landfill cover is in good condition showing no significant erosion. The grass cover appears to be comprised of dead rye grass and little else. The landfill requires mowing to determine if the vegetation will regenerate or if any grass is present. The fence is in excellent condition.

The Area 22 Demolition Debris Landfill was inspected last and it's condition was the same as the Non Hazardous Landfill. Erosion is temporarily controlled but the grass cover appears to be dead rye grass and requires mowing.

The site walk over was completed and the participants left the site.

B. RISK INFORMATION REVIEW

C. DATA REVIEW

There is no data to review. The landfills are closed and closure was accomplished without the installation of groundwater monitoring wells. There is not a groundwater remedy in place at this time.

VII. ASSESSMENT

- **A. Is the remedy functioning as intended by the decision documents?**

The remedy for the Non Hazardous Landfill is functioning as intended by the decision documents. The contaminated soils, sediments and industrial sewer lines were excavated, thermally decontaminated and, if required, stabilized prior to disposal. The contaminated media have been made non-hazardous and no longer present a threat to human health or the environment. The non-hazardous waste on-site landfill is fenced and located on a fenced military reservation.

The remedy for the Area 22 - Demolition/Debris Landfill is functioning as intended. The landfill has been capped with a polyvinyl chloride geomembrane liner and a protective clay cap. The landfill has been isolated from precipitation and can no longer affect the groundwater at the site.

The asbestos repository was created during building demolition operations at the site. The cap repairs to the asbestos repository have been performed to protect the public health but are not a part of the CERCLA operations at the site. The cap repairs have prevented unauthorized access to the repository.

- **B. Are the assumptions used at the time of remedy selection still valid?**

The assumptions used for the remedy selection remained valid throughout the remediation process, although the volume of soil requiring remediation was about 25% greater than estimated in the FS.

- **C. Has any other information come to light that could call into question the protectiveness of the remedy?**

Characterization during and subsequent to the remediation has revealed nothing that could call into question the remedy's protectiveness.

VIII. DEFICIENCIES

Noted deficiencies were at the NHWL and at the Area 22 Demolition Debris landfills where it could not be ascertained if the grass cover was viable and capable of regenerating. The sites are covered with dead rye grass.

The asbestos repository and the Area 22 Landfill require fencing to meet the provisions of ADEM post closure requirements.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

All three landfill areas should be mowed. The maintenance agreement between the Childersburg Local Reuse Authority and the Army will be reviewed to determine which entity is responsible for mowing.

Bids have been received and a funds request send forward to Operating Services Command (OSC) and Army Materiel Command (AMC) for funding to complete the fencing.

X. PROTECTIVENESS STATEMENT

The remedy at OU-2 is protective of human health and the environment, exposure pathways that could result in unacceptable risks are being controlled, and institutional controls are in place and operating effectively.

XI. NEXT REVIEW

This is a statutory site that requires ongoing five-year reviews. The next review will be conducted within five years of the completion of this five-year review report. The completion date is the date of the signature shown on the signature cover attached to the front of the report.

ATTACHMENT A

DOCUMENTS REVIEWED

A variety of previous assessments, surveys, and investigations have been conducted at ALAAP. The documents outlining these previous assessments were reviewed as part of the records review and included the following:

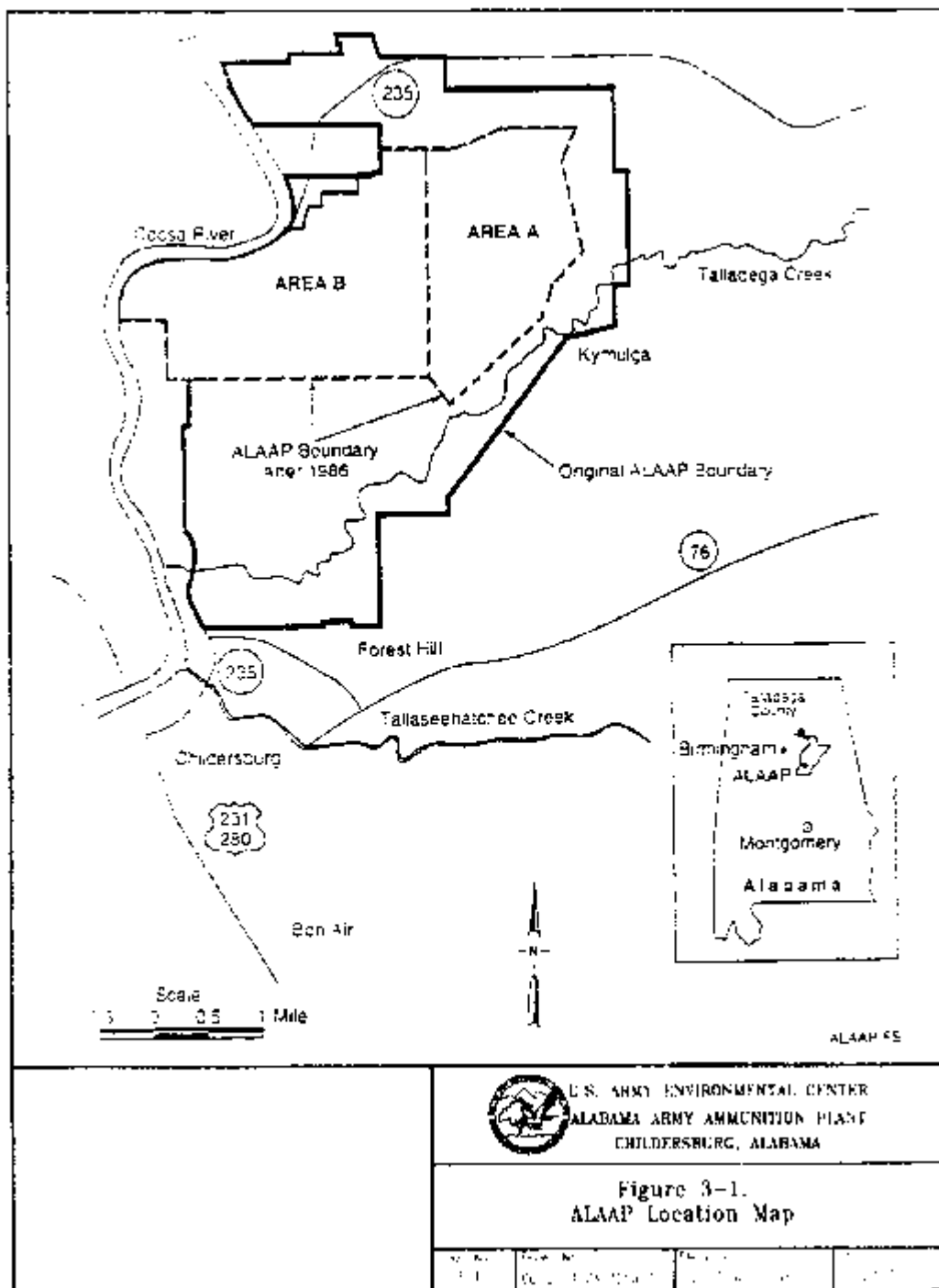
- ECC (Environmental Chemical Corporation). 1998. Closure Report. Excavated Lead Contaminated Soil Areas 16 & 19 at Alabama Army Ammunition Plant, Childersburg, Alabama.
- The Earth Technology Corporation (TETC). 1994. Community Environmental Response Facilitation Act (CERFA) Report. April.
- ESE (Environmental Science & Engineering, Inc.). 1981. Environmental Survey of Alabama Army Ammunition Plant, Final Report for Period September 1979 – October 1980. July.
- ESE. 1983. Confirmatory Environmental Survey, Alabama Army Ammunition Plant. Final Report. June.
- ESE. 1986. Alabama Army Ammunition Plant Remedial Investigation Final Report. July.
- ESE. 1987. Alabama Army Ammunition Plant Feasibility Study. Final Report. November.
- ESE. 1991a. Remedial Investigation/Feasibility Study (RI/FS) of the Industrial Sewer System, Alabama Army Ammunition Plant. September.
- ESE. 1991b. Supplemental Remedial Investigation/Feasibility Study (RI/FS) for Area B Alabama Army Ammunition Plant. Draft Final Remedial Investigation. Volume I.
- ESE. 1991c. Stockpile Characterization Report for Alabama Army Ammunition Plant. January.
- ESE. 1992. Supplemental Remedial Investigation/Feasibility Study (RI/FS) for Area B, Alabama Army Ammunition Plant, Final Baseline Risk Assessment. Volumes I and II. August.
- ESE. 1993. Supplemental Remedial Investigation/Feasibility Study (RI/FS) for Area B, Alabama Army Ammunition Plant, Final Remedial Investigation. Volumes I and II. June.
- ESE. 1995. Supplemental Remedial Investigation/Feasibility Study for Area A, Alabama Army Ammunition Plant Final Draft Remedial Investigation. Volume I. December.
- ESE. 1996. Land Reuse Plan, Alabama Army Ammunition Plant. August.

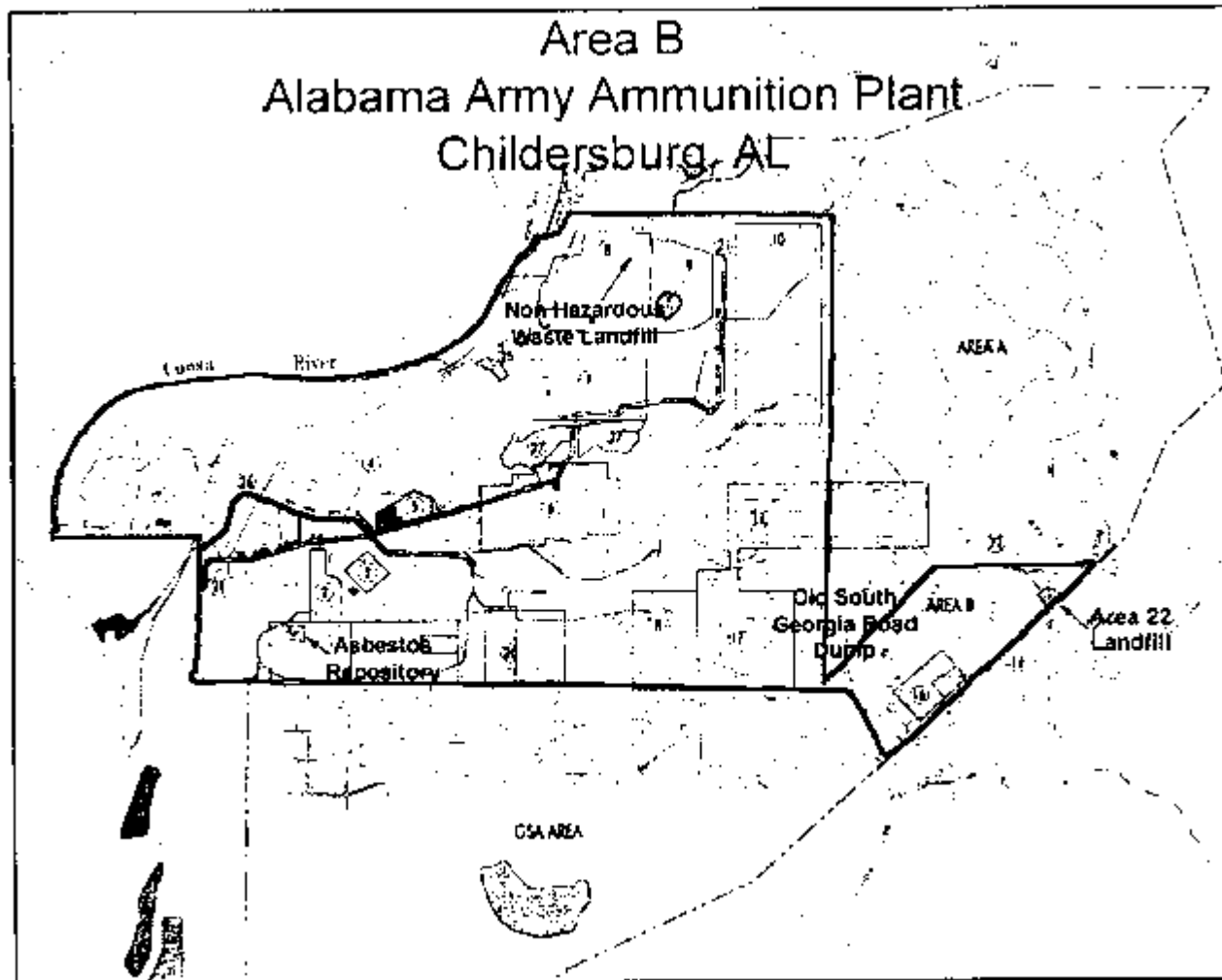
- SAIC (Science Applications International Corporation). 1999. Alabama Army Ammunition Plant – Area B Draft Final Version 2 Supplemental Remedial Investigation Report. April.
- SAIC. 1996. Alabama Army Ammunition Plant Area B Draft Final Feasibility Study Report. March.
- USACE (U.S. Army Corps of Engineers). 1999. Alabama Army Ammunition Plant Remedial Actions. Partnering Conference Presentation by Ken Gray. February 16.
- USAEC (U.S. Army Environmental Center). 1995. Site Management Plan, Alabama Army Ammunition Plant, Talladega County, Alabama. May 10.
- USATHAMA (U.S. Army Toxic and Hazardous Materials Agency). 1978. Installation Assessment of Alabama Army Ammunition Plant, Report No. 130.
- Weston (Roy F. Weston, Inc.). 1991. Feasibility Study for the Alabama Army Ammunition Plant Soil Stockpile Area. October.
- Weston. 1994. Draft Interim Record of Decision, Alabama Army Ammunition Plant (ALAAP), Area B Soils Operable Unit. July.
- Weston. 1994. Excavation Plan for Area 21 (Red Water Ditch) at the Alabama Army Ammunition Plant (ALAAP), Childersburg, Alabama.
- Weston. 1994. IROD Stockpile Soils. April.
- Weston. 1994. IROD, Alabama Army Ammunition Plant, Study Areas 6, 7, 10, and 21 of the Area B Soil Operable Unit. November.
- Weston. 1995. Monthly Status Report – Study Areas 7 and 21 and Excavation Plan for Study Area 7, Alabama Army Ammunition Plant, Childersburg, Alabama. January.
- Weston. 1995. Excavation Plan for Study Area 21, Alabama Army Ammunition Plant, Childersburg, Alabama. April.
- Weston. 1996. Excavation Status Report for Study Area 10 and Updated Excavation Volumes for Study Areas 6, 7, and 21. February.
- Weston. 1996. IROD for Area B Soils Operable Unit IV (Study Areas 2, 5, 8, 9, 10, 16, 17, 19, and 22). April.
- Weston. 1996. IROD for Area B Soils Operable Unit IV (Study Areas 2, 10, 16, 17, 19, and 22). October.

- Weston. 1996. Addenda to the Work Plan for a Transportable Incinerator System: Remediation of Contaminated Soils from Area B, Operable Unit IV, Study Areas 2, 16, 17, and 19 at the Alabama Army Ammunition Plant. October.
- Weston. 1996. Sampling Report: Study Areas 2 and 17. November.
- Weston. 1996. Study Areas 16 and 19 Sampling Report. March.

ATTACHMENT B

SITE MAPS





ATTACHMENT C

SAMPLING DATA RESULTS

ATTACHMENT D

SITE INSPECTION CHECKLIST

ALABAMA ARMY AMMUNITION PLANT

FIVE-YEAR REVIEW

INSPECTION CHECKLIST

1. SITE INFORMATION

Site Name Alabama Army Ammunition Plant

Date of Inspection
June 20, 2002

Location and Region: Region 4

EPA ID: AL6210020008

Agency, office or company leading the five-year review:

Weather/temperature

Remedy Includes (Check all that apply)

☒ Landfill cover/containment

☐ Groundwater pump and treatment

☐ Surface water collection and treatment

☐ Other _____

☒ Inspection team roster attached

☒ Site map attached

2. INTERVIEWS (Check all that apply)

1. O&M Site Manager N/A _____
Name Title Date
Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
Problems, suggestions: ☐ Report attached _____
ALAAP is a closed facility, without a Final ROD and there is not a Site Manager.
The inspected remedies are complete

2. O&M Staff N/A _____
Name Title Date
Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
Problems, suggestions; ☐ Report attached _____
There is no O&M staff at this time. Periodic inspections are conducted by COE personnel that are on-site during sampling and monitoring activities.

3. Local regulatory authorities and response agencies (i.e., State and Tribal Offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Alabama Department of Environmental Management (ADEM)

Contact C.H. Cox
Name

Project Engineer
Title

20 June 2002
Date

4. Problems, suggestions: ☒ Report attached: landfill caps need mowing

3. ONSITE DOCUMENTS & RECORD VERIFIED (Check all that apply)

1. **O&M Manual** ☐ Readily available ☐ Up to date ☒ N/A

Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks: Since ALAAP does not have a FINAL ROD and investigations are not complete at this time O&M manuals have not been prepared.

2. **Site Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

Emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: No emergency response plan required because there are no personnel onsite.

3. **O&M, OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: See number 2 above.

4. **Groundwater Monitoring Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks: Groundwater monitoring records associated with investigations are complete and on file at USACE, Mobile District (CESAM-EN-GG) and at the A/E's office.

5. **Permits and Service Agreements**

☐ Air Discharge Permit ☐ Readily available ☐ Up to date ☒ N/A
☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
☐ Other permits _____ ☐ Readily available ☐ Up to date ☒ N/A
Remarks: No permits are require at this time.

6. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A
☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A
Remarks_____No discharge permits

7. **Daily Access/Security Logs**

☐ Readily available ☐ Up to date ☒ N/A

Remarks: Site is a closed military reservation and there are no personnel on-site to maintain logs.

4. GENERAL SITE CONDITIONS

Whenever possible, actual site conditions should be documented with photographs

A. Fencing

1. Fencing damaged ☐ Location shown on map ☒ Gates secured ☐ N/A
Remarks: Entire perimeter fence was repaired in 2001.

B. Site Access

1. Access restrictions, signs, other security measures.

Remarks: Site is fenced with locked gates and no trespassing signs. Facility is closed with no personnel on-site.

C. Perimeter Roads

1. Roads damaged ☒ Location shown on map ☒ Roads adequate ☐ N/A

Remarks: Site roads have suffered natural deterioration and significant damage due to remedial activities.

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks: Trespassing has been a problem in the past but no vandalism noted.

2. Land use changes on site None

3. Land use changes off site No significant changes

4. Institutional Controls (site conditions imply institution controls not being enforced)

☒ N/A

6. LANDFILL COVERS ☒ Applicable ☐ Not Applicable

7. VERTICAL BARRIERS ☐ Applicable ☒ Not Applicable

8. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ Not Applicable

A. Groundwater Extraction Wells, Pumps and Pipelines

☐ Applicable ☒ Not Applicable

1. Pumps, Wellhead Plumbing, and Electrical

☒ Good condition ☐ All required wells located ☐ Needs O&M ☐ N/A

Remarks_____Groundwater wells are monitoring wells for the ongoing groundwater investigation; they are not associated with the remedy.

2. Extraction System Pipeline, Valves, Valve Boxes, and Other Appurtenances

None in place.

B. Surface Water Collection Structures, Pumps and Pipelines N/A

C. Treatment System ☐ Applicable ☒ Not Applicable

D. Monitored Natural Attenuation

1. Monitoring Wells ☒ Properly secured/locked
☒ Functioning ☐ Routinely sampled
☒ Good condition ☒ All required wells located ☐ Needs O&M ☐ N/A
Remarks_____

ATTACHMENT E

PHOTOGRAPHS